BROOKHAVEN NATIONAL LABORATORY
NATIONAL SYNCHROTRON LIGHT SOURCE

MEMORANDUM

DATE: 5 September 2000

TO: Sam Krinsky, Richard Osgood, Peter Paul

CC: NSLS Management Group, FEL Project Team

FROM: William S. Graves, Richard Heese, Erik D. Johnson

SUBJECT: DUV-FEL Project Report; Period ended 1 September 2000

Work in Progress:

Since the last progress report we have installed the remachined cathode plate, the COUR undulator, and completed a number of outstanding punch list items. We are preparing for characterization of the machine in its current state. The specifics of the completed work are as follows;

Photoinjector

The remachined cathode plate was installed and tuned. During the change out process the dummy plate with the quartz window was briefly installed to examine the laser spot on the surrogate cathode surface. This procedure verified that the image obtained at the reference monument on the gun hutch optics table matches the actual spot at the cathode plate location. The new cathode (the remachined #1 copper cathode plate) was then installed by XiJie Wang and adjusted to tune and balance the gun. This was followed by an extensive series of low power measurements by Jim Rose and Bill Graves to provide reference data for modeling our gun. The high power waveguide was then installed, baked out, and the photo-injector was RF conditioned. Thus far only one days running photo-beam has been completed, but the results are very encouraging. Although it is only a qualitative measure, the electron beam is no longer clipped on the normal incidence mirrors. A detailed characterization program will be undertaken in the first week of September.

COUR (Coherent Undulator Radiation)

The installation of the magnet was delayed due to ambiguities in the measurements. These were rectified and a good trajectory (from magnetic measurements) was obtained by George Rakowsky and Dave Harder that leaves all but the first and last poles at full field strength. A calculated RMS trajectory wander of less than 10% of the wiggle amplitude was obtained with a phase error of 1 degree or less over the central 18 poles. The detector for the experiment (a bolometer) has been received and light pipes are being constructed.

Punchlist

This category is a catch-all of various work that generally improves operations. The most recently completed items include stepper encoder and water temperature readbacks. Software packages like save/restore, a history program, and a power supply wobbler program. Several features of laser operation/control were also automated (or put under remote control) including the output power, beam steering, the laser shutter, and on-line monitoring of the laser power.

Work Planned for Next Week(s):

The major activity will be characterizing the photo-injector performance with its new cathode. As performance allows measurements of the beam properties will be made. When reliable operation is established, we should be able to complete the radiation protection fault studies before continuing with beam characterization and experiments. In parallel, planning and preparation for the connection of the linac to the NISUS undulator will continue.

Management:

No new issues.